

Data taken on 31 Jan. 2002 with scintillator
(52 data runs, 1.9 GBytes)

Took pedestal and led data to check noise with HV on at 7 kV (width increases from 1.1 the previous week with no HV to 1.3 with HV)

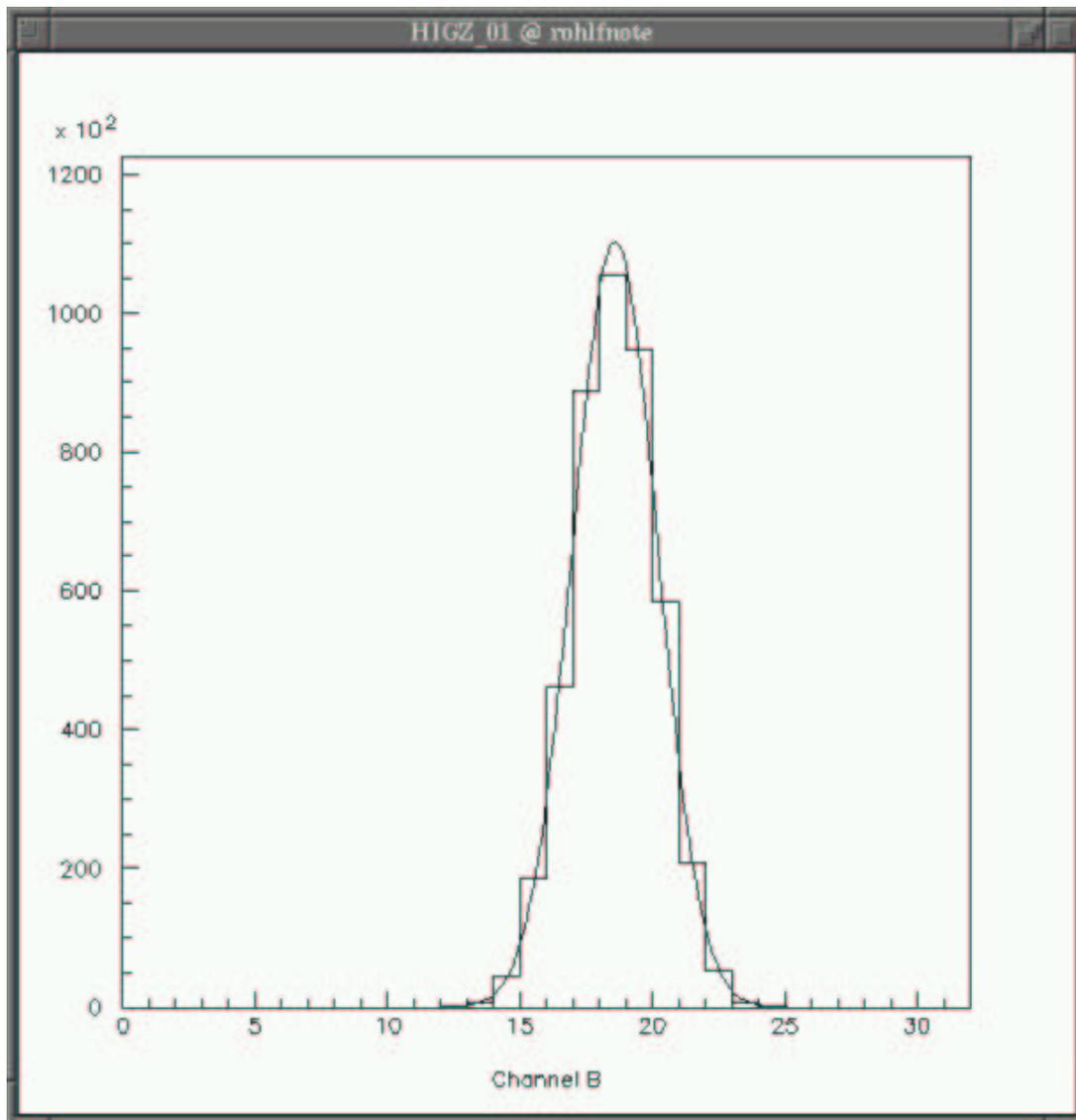
Tried to see 17 micro-C source (just for fun)

Took led data while waiting for stronger source to arrive

1 mC source arrives at 3 pm, can't see it immediately

Adjust fiber location on HPD

See source clearly and take data on/off for 2 h in calibration mode at 7 kV



**Run 10261, pedestal
Ch. B all Caps**

0.4 M events

18.089 ± 0.002

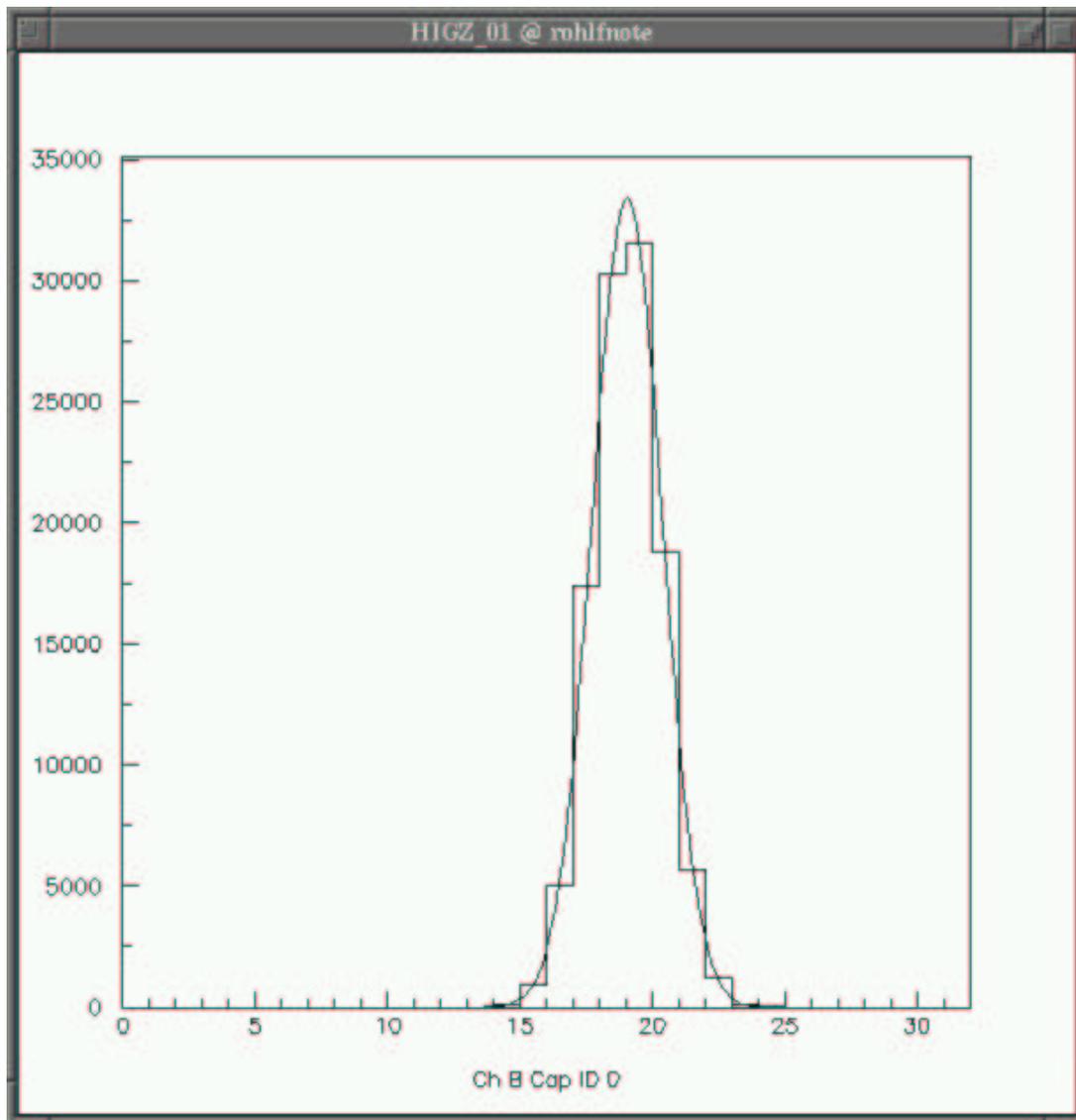
$\sigma = 1.603 \pm 0.002$

EXT PARAMETER

STEP FIRST

NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	Constant	0.11041E+06	200.12	279.31	-0.41532E-07
2	Mean	18.589	0.24187E-02	0.47027E-01	-16.952
3	Sigma	1.6027	0.16153E-02	0.40546E-02	-13.280

CHISQUARE = 0.5797E+02 NPFIT = 18



**Run 10261, pedestal
Ch. B Cap ID = 0**

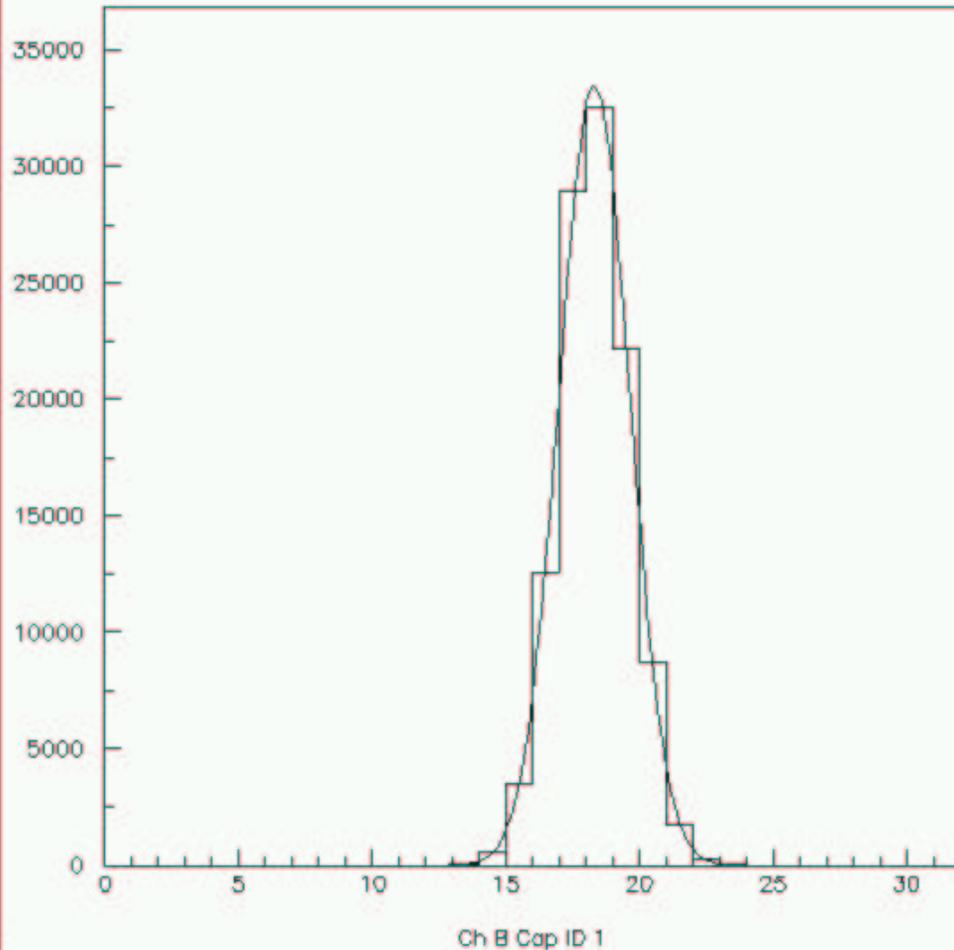
0.1 M events

18.550 ± 0.004

$\sigma = 1.324 \pm 0.003$

EXT	PARAMETER	STEP	FIRST		
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	Constant	33454.	124.09	84.632	-0.91608E-05
2	Mean	19.050	0.39749E-02	0.48194E-01	0.17653
3	Sigma	1.3239	0.28546E-02	0.33492E-02	-2.5962

CHISQUARE = 0.7285E+01 NPFIT = 15



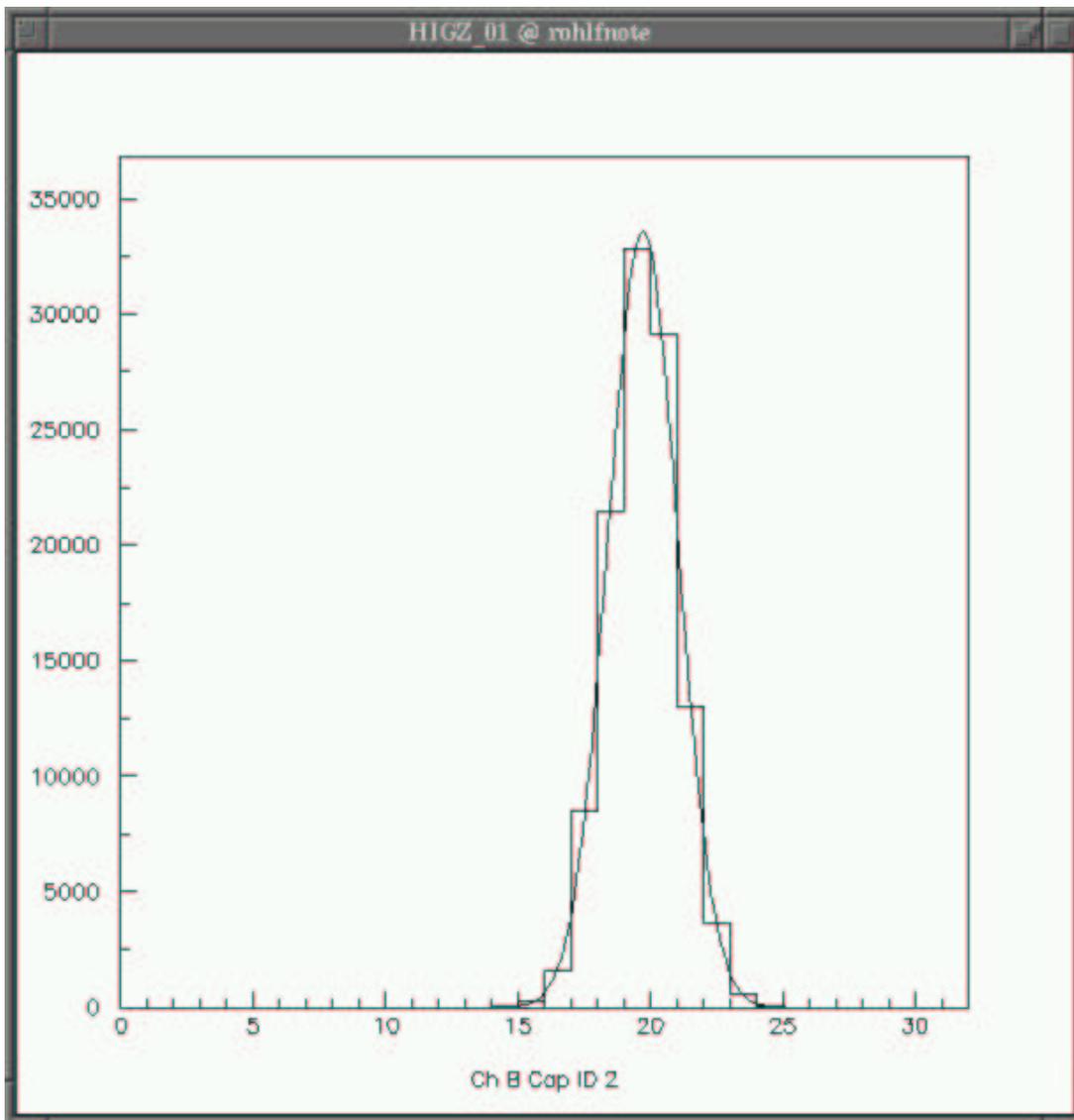
Run 10261, pedestal
Ch. B Cap ID = 1

0.1 M events

17.812 ± 0.004

$\sigma = 1.323 \pm 0.003$

EXT	PARAMETER			STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	Constant	33456.	124.61	84.639	-0.63124E-05
2	Mean	18.312	0.39740E-02	0.46326E-01	1.7546
3	Sigma	1.3234	0.28851E-02	0.33480E-02	-2.7766
CHISQUARE = 0.9096E+01 NPFIT = 16					



Run 10261, pedestal
Ch. B Cap ID = 2

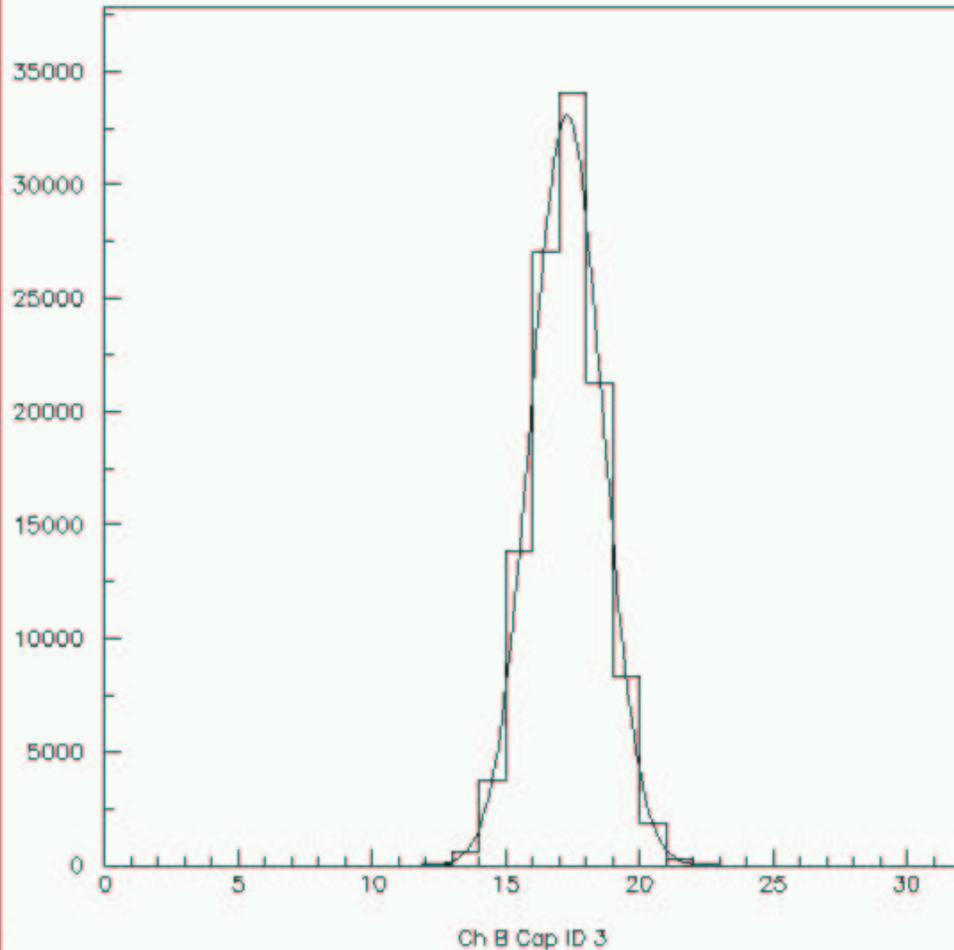
0.1 M events

19.220 ± 0.004

$\sigma = 1.319 \pm 003$

EXT	PARAMETER			STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	Constant	33573.	124.74	84.934	-0.60208E-05
2	Mean	19.720	0.39635E-02	0.49887E-01	-0.59073
3	Sigma	1.3190	0.28620E-02	0.33369E-02	-2.9135

CHISQUARE = 0.8460E+01 NPFIT = 15



**Run 10261, pedestal
Ch. B Cap ID = 3**

0.1 M events

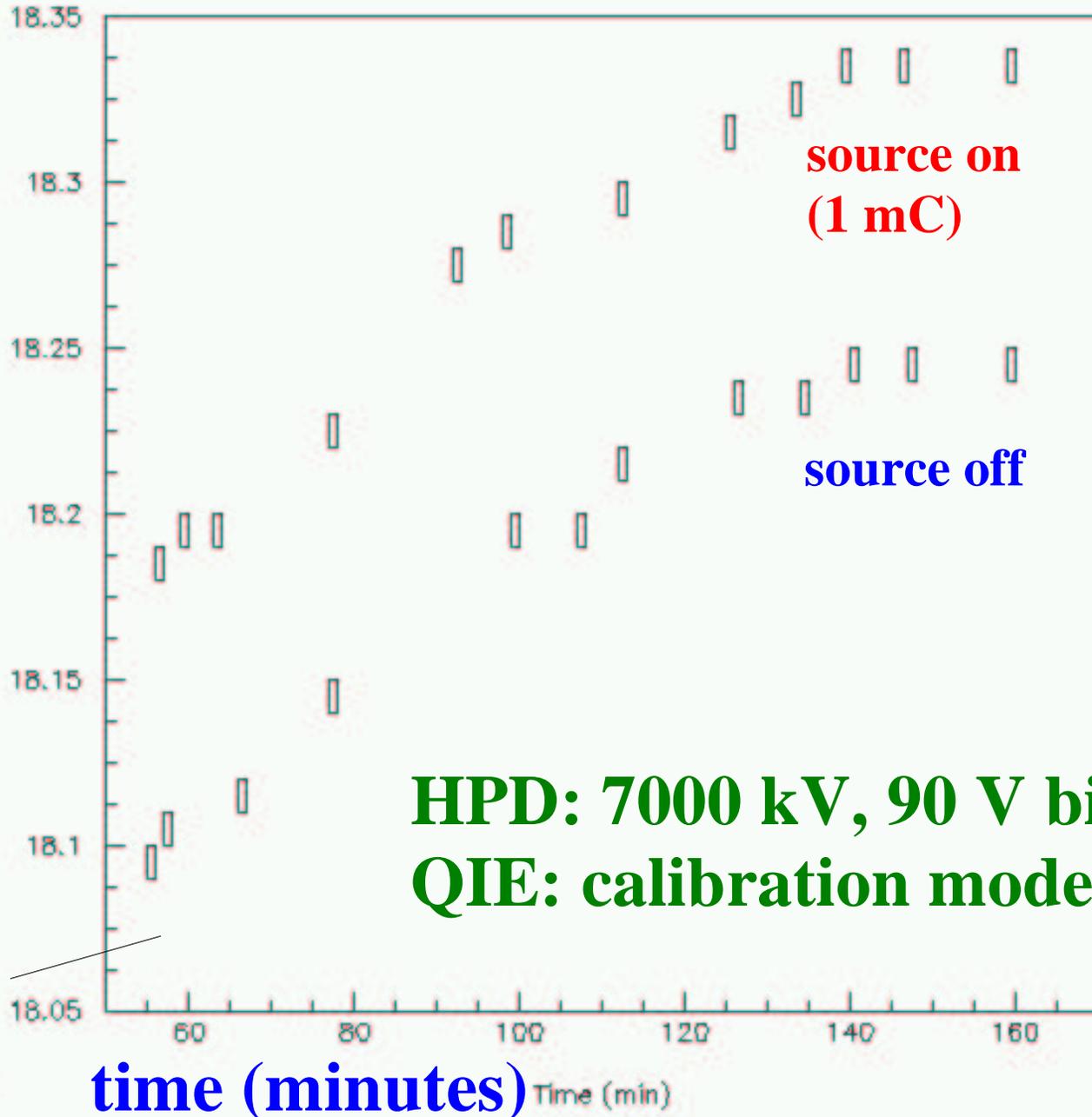
16.782 ± 004

$\sigma = 1.337 \pm 0.003$

EXT	PARAMETER	STEP	FIRST		
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	Constant	33111.	123.52	83.766	-0.12907E-04
2	Mean	17.282	0.40153E-02	0.43721E-01	-0.96354
3	Sigma	1.3372	0.29311E-02	0.33828E-02	-2.4250
CHISQUARE = 0.9296E+01		NPFIT = 16			

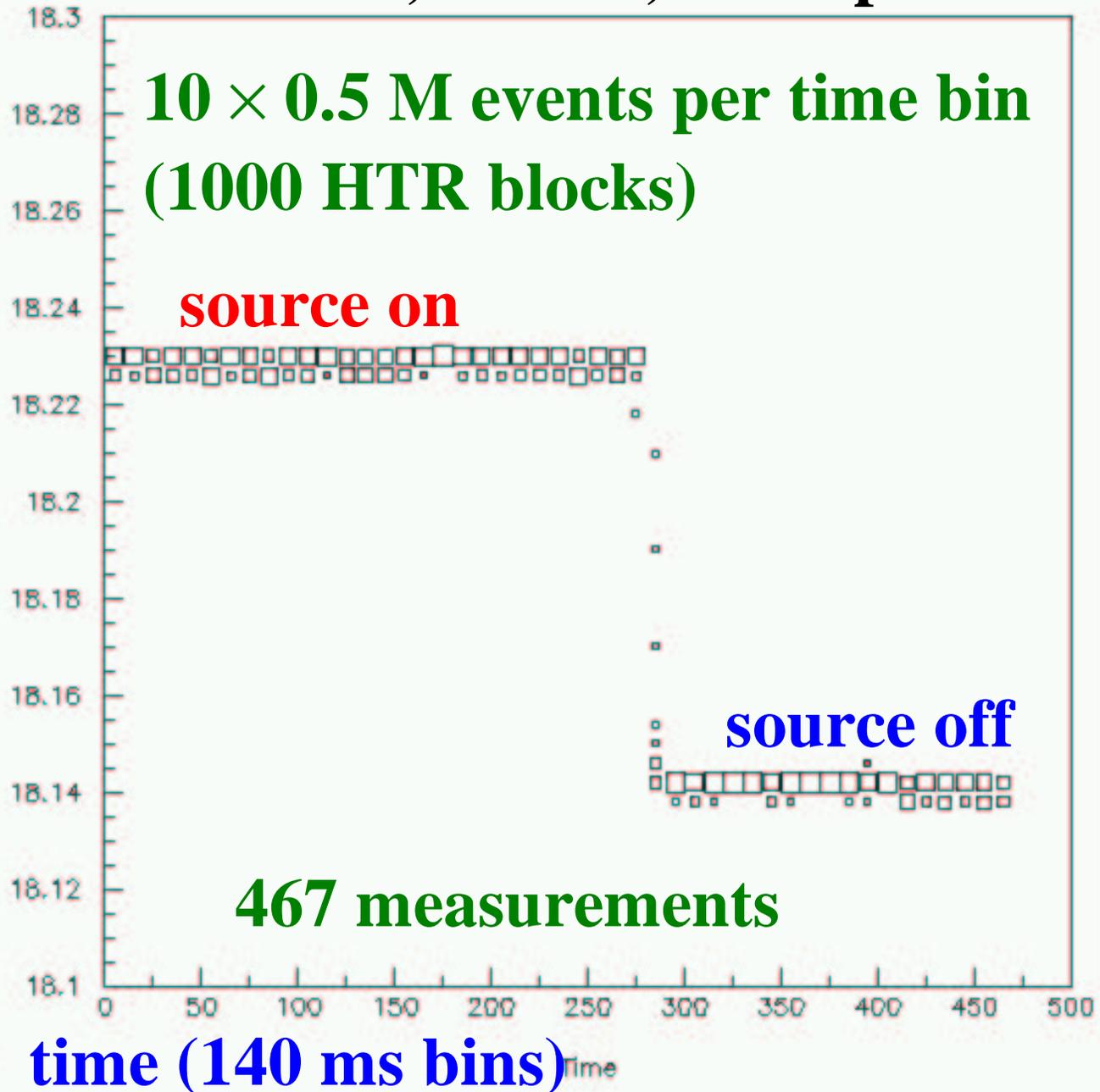
Data of 31-Jan-02, Ch. B (all Caps)

**Mean
(channels)**

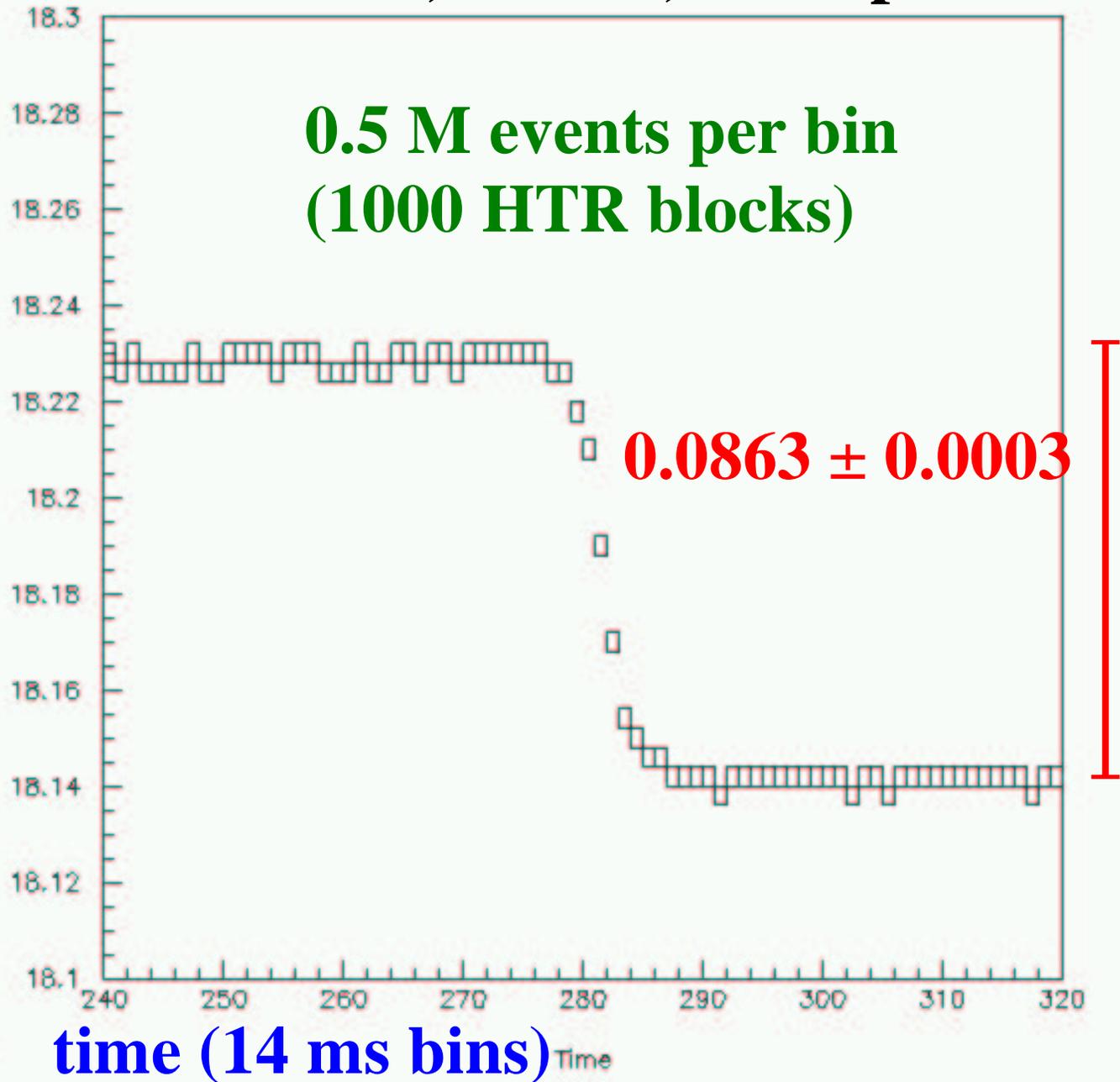


Run 10269, Ch. B, all Caps

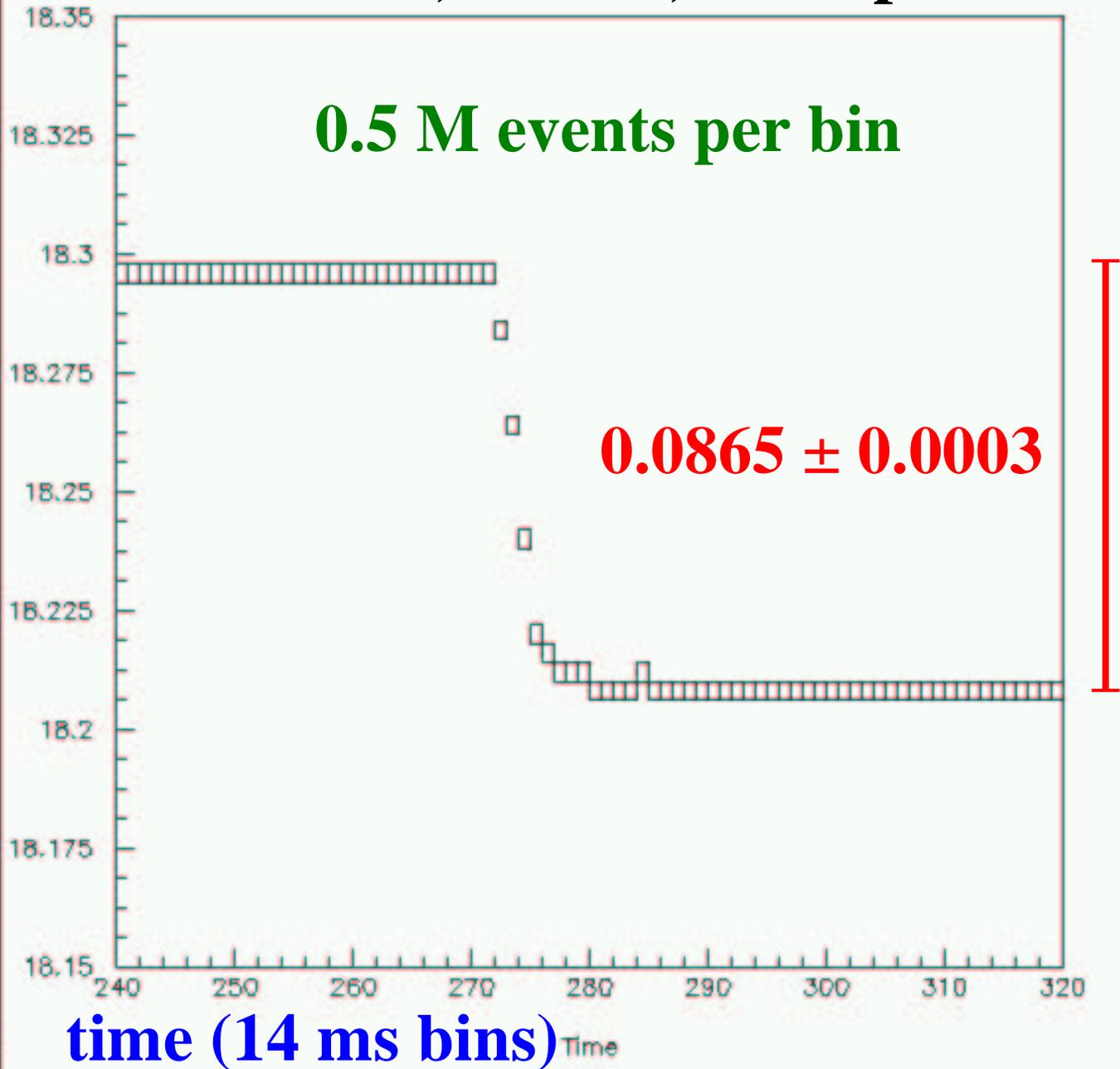
Mean
(channels)



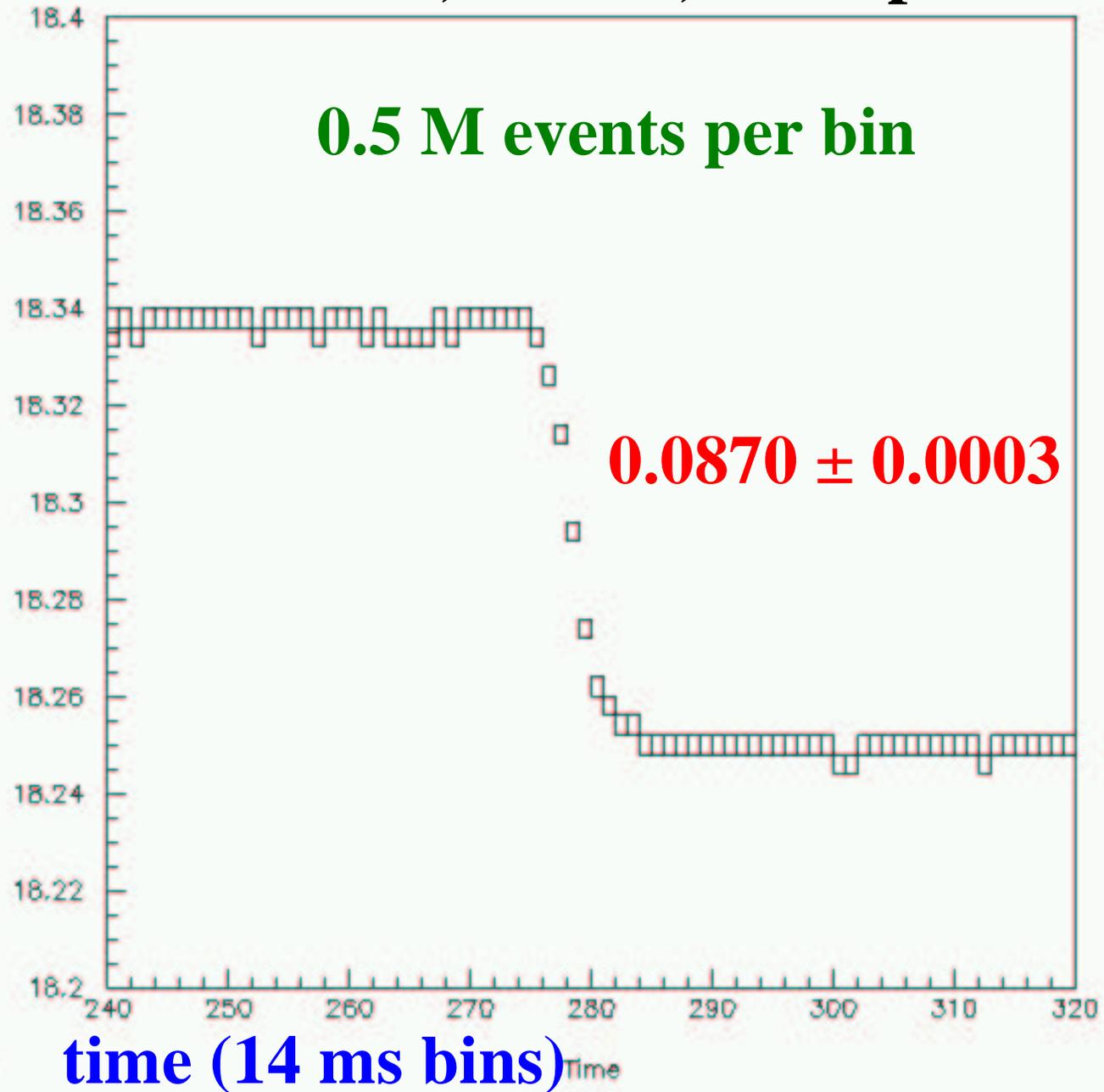
Run 10269, Ch. B, all Caps



Run 10275, Ch. B, all Caps



Run 10287, Ch. B, all Caps



**Source gives signal of
 0.0866 ± 0.0002**

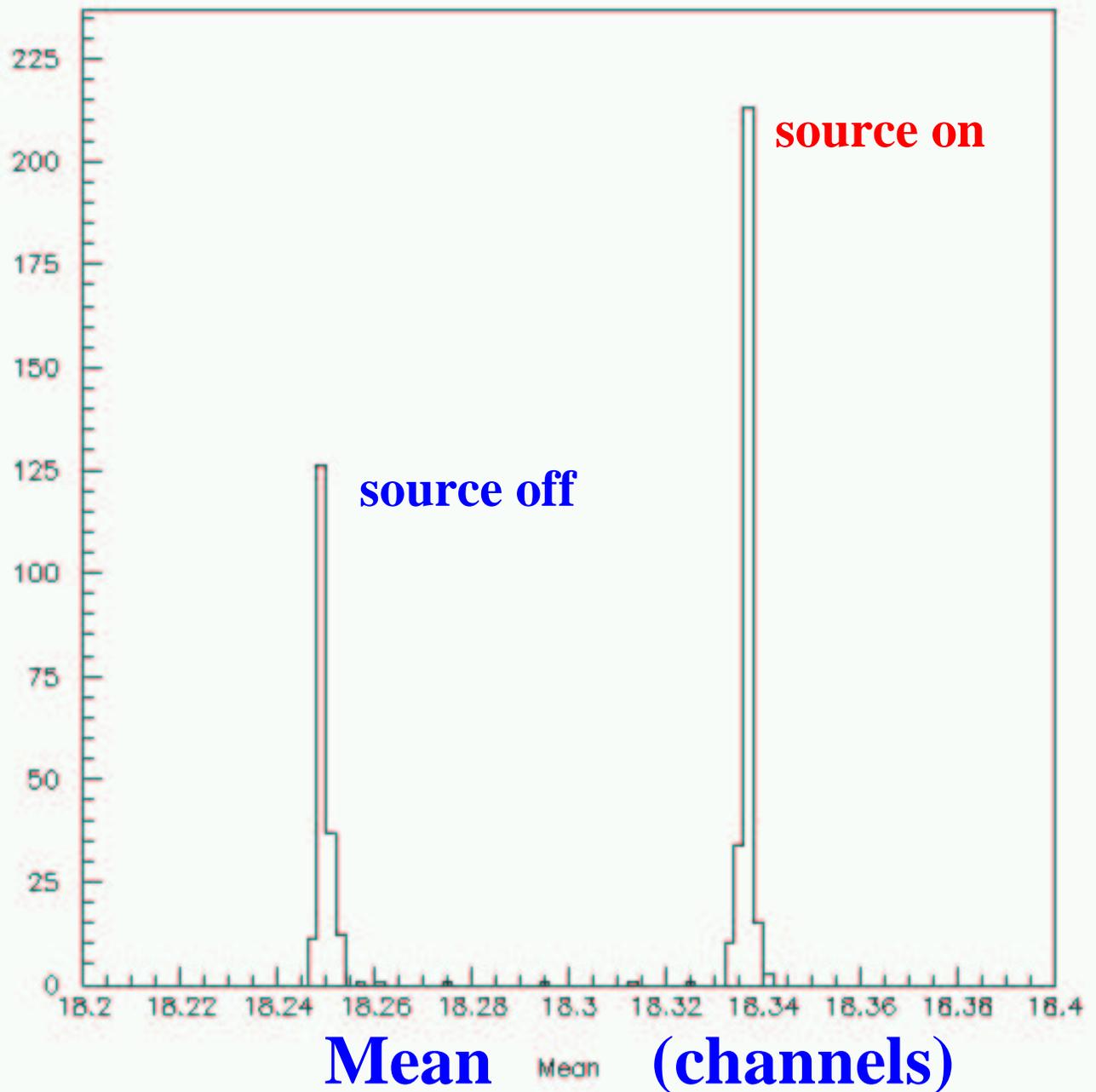
measured with 6×10^8 events!

**Seen on top of a gaussian pedestal
with a width of 1.6**

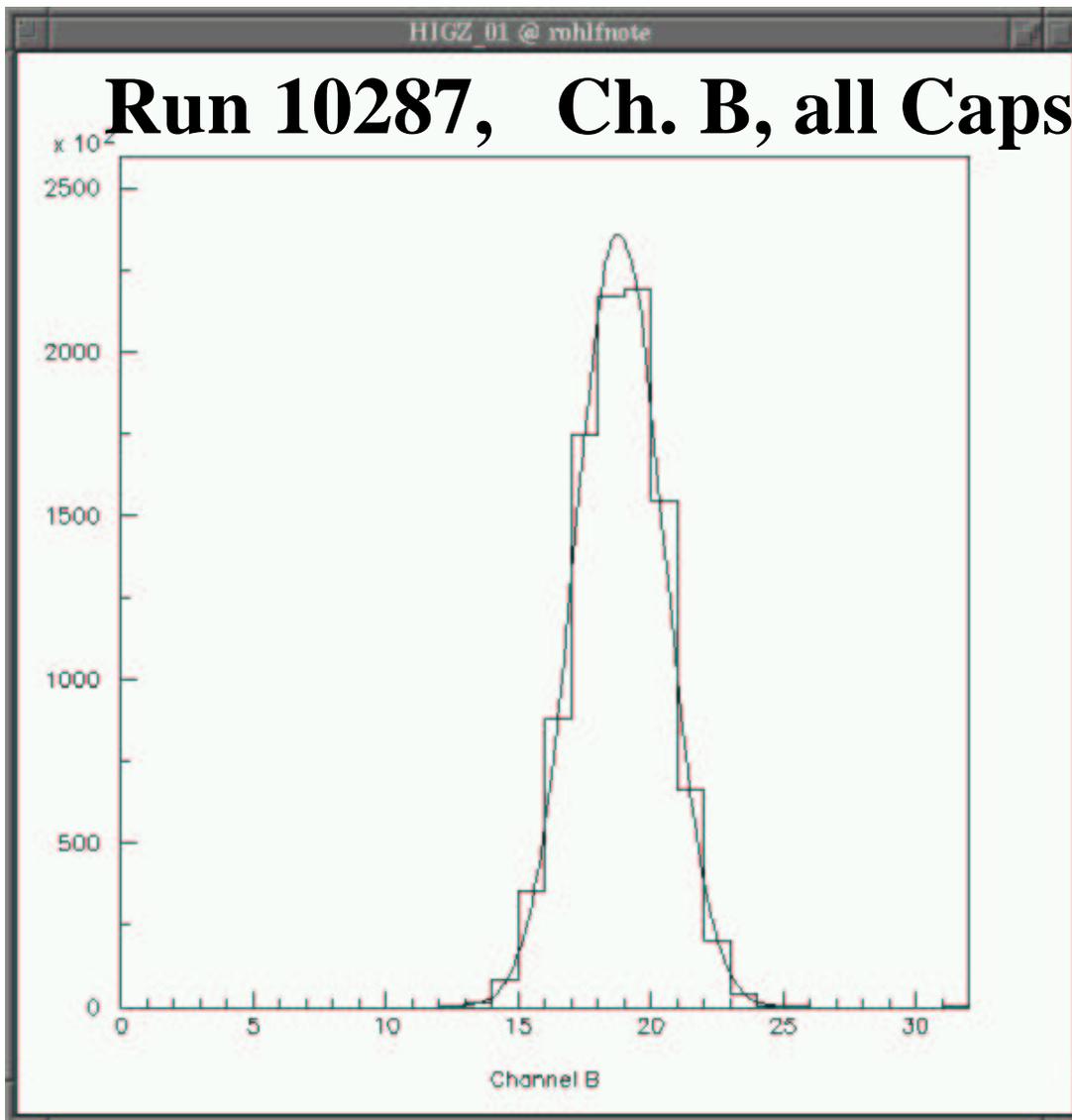
**Reproducible over time–scale of
2 hours**

Run 10287, Ch. B, all Caps

Number of
measurements
(0.5 M events)
per 0.002 ch.



Mean Mean (channels)



1 M events

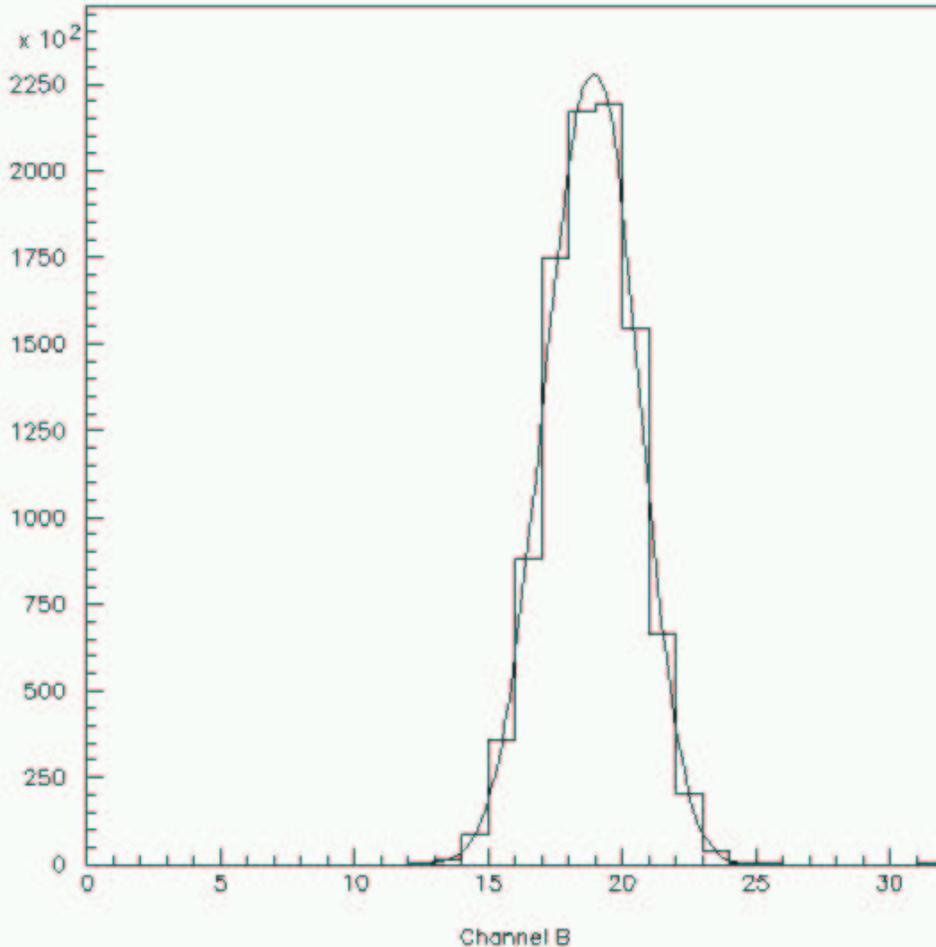
**From mean:
0.0870 ± 0.017**

**From fit (g+p):
0.0876 ± 0.015**

EXT	PARAMETER	STEP	FIRST		
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	P1	0.24146E+06	242.91	610.84	-0.88025E-04
2	P2	0.87629E-01	0.14759E-02	0.31000E-02	24.093

CHISQUARE = 0.1585E+03 NPFIT = 24

Run 10287, Ch. B, all Caps



From fit (4g+p):
 0.0867 ± 0.0015

Comments:

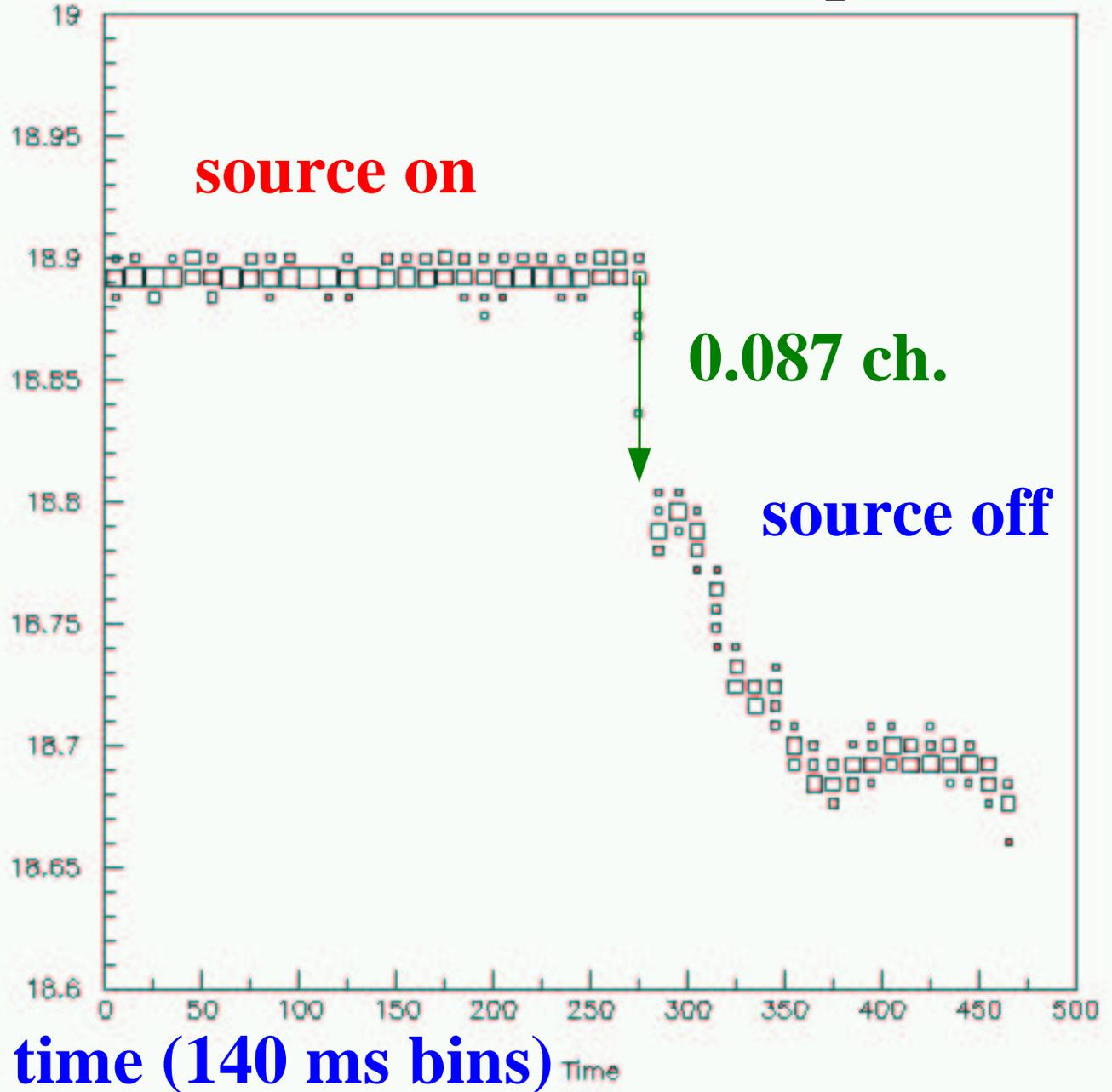
- 1) This is a check of the observed pulse shape with source
- 2) Need to know mean from each cap to do this fit

EXT	PARAMETER			STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	P1	98728.	99.169	-7.3996	0.53694E-05
2	P2	0.86691E-01	0.14941E-02	-0.31544E-04	1.8051

CHISQUARE = 0.5055E+02 NPFIT = 24

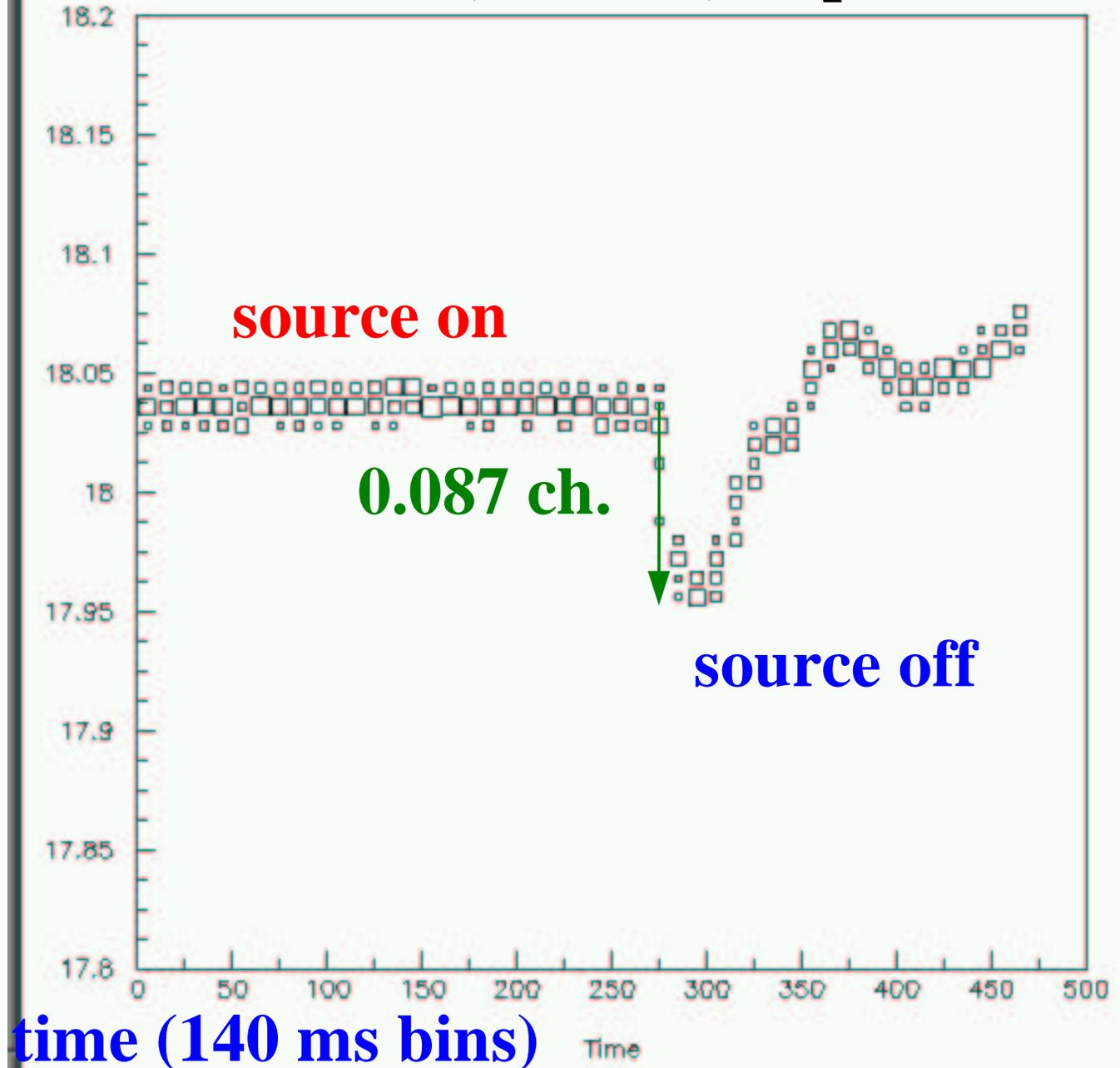
Run 10287, Ch. B, Cap ID = 0

Mean
(channels)



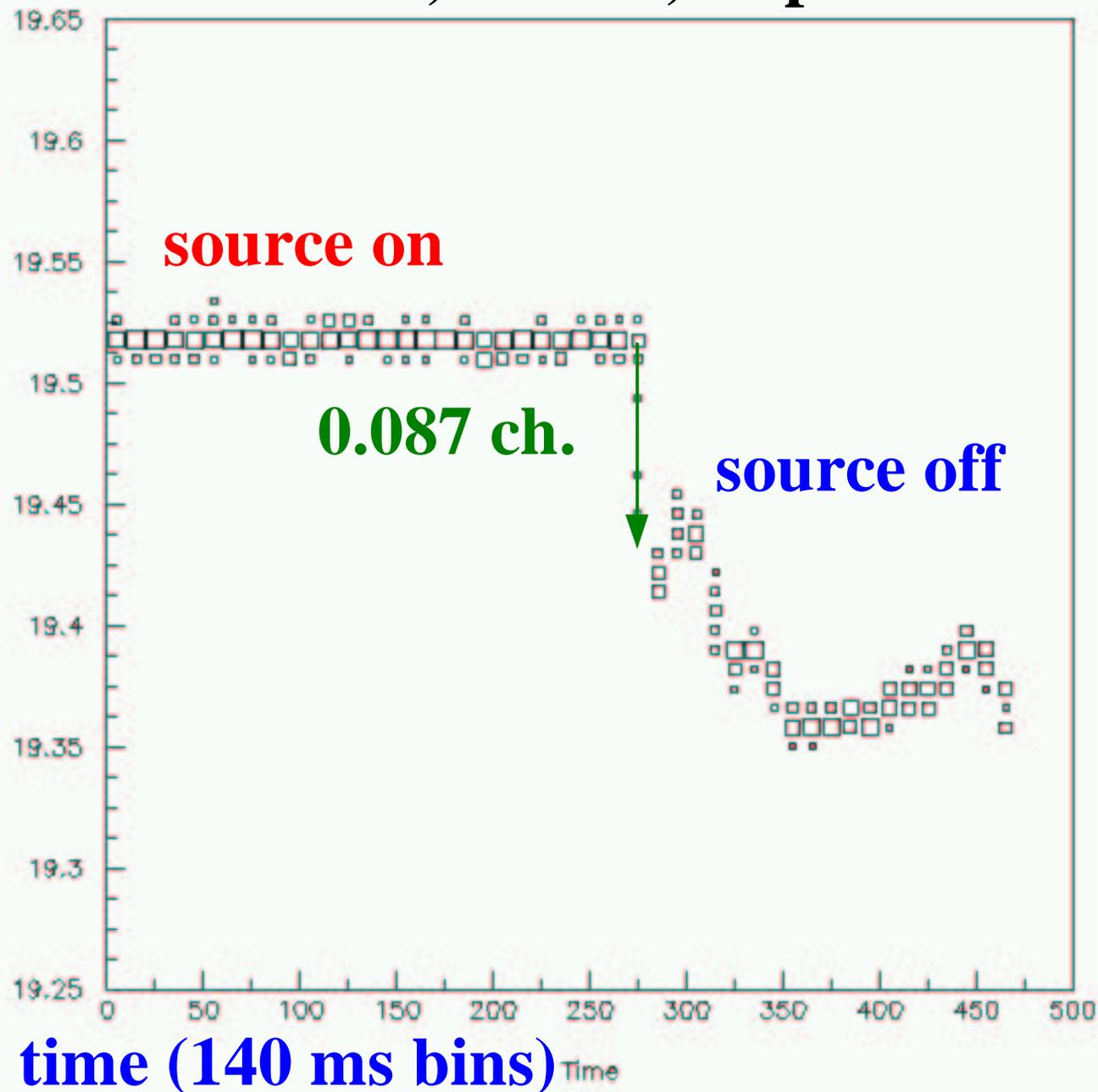
Run 10287, Ch. B, Cap ID = 1

**Mean
(channels)**



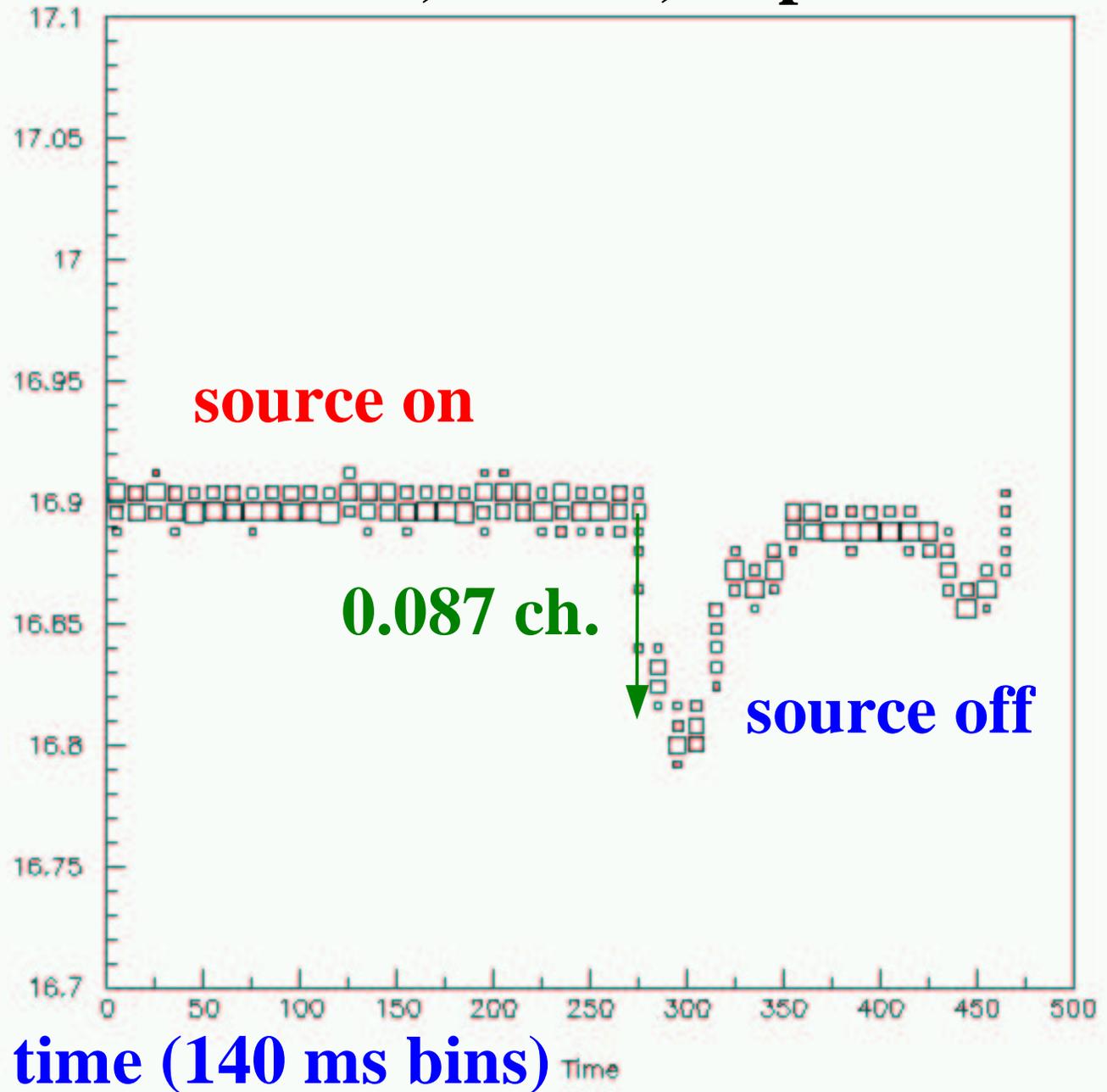
Run 10287, Ch. B, Cap ID = 2

Mean
(channels)



Run 10287, Ch. B, Cap ID = 3

**Mean
(channels)**



Run 10287

Statistics for segment = 200

Channel B: ave. =18.337 +/- 0.002 sigma = 1.691

Cap ID 0: ave. =18.892 +/- 0.004 sigma = 1.368

Cap ID 1: ave. =18.038 +/- 0.004 sigma = 1.384

Cap ID 2: ave. =19.515 +/- 0.004 sigma = 1.370

Cap ID 3: ave. =16.901 +/- 0.004 sigma = 1.391

Statistics for segment = 400

Channel B: ave. =18.250 +/- 0.002 sigma = 1.617

Cap ID 0: ave. =18.699 +/- 0.004 sigma = 1.330

Cap ID 1: ave. =18.048 +/- 0.004 sigma = 1.344

Cap ID 2: ave. =19.359 +/- 0.004 sigma = 1.327

Cap ID 3: ave. =16.896 +/- 0.004 sigma = 1.346

Run 10275

Statistics for segment = 200

Channel B: ave. =18.296 +/- 0.002 sigma = 1.681

Cap ID 0: ave. =18.871 +/- 0.004 sigma = 1.354

Cap ID 1: ave. =17.967 +/- 0.004 sigma = 1.371

Cap ID 2: ave. =19.469 +/- 0.004 sigma = 1.366

Cap ID 3: ave. =16.877 +/- 0.004 sigma = 1.376

Statistics for segment = 400

Channel B: ave. =18.211 +/- 0.002 sigma = 1.572

Cap ID 0: ave. =18.606 +/- 0.004 sigma = 1.318

Cap ID 1: ave. =18.084 +/- 0.004 sigma = 1.338

Cap ID 2: ave. =19.218 +/- 0.004 sigma = 1.322

Cap ID 3: ave. =16.936 +/- 0.004 sigma = 1.340

Signal change in individual Caps (source in – source out, samples 200 and 400)

Run	10269	10275	10269
Cap 0	-0.17	-0.27	-0.19
Cap 1	+0.02	+0.12	+0.01
Cap 2	-0.15	-0.25	-0.16
Cap 3	- 0.04	+0.06	-0.00

Ave: -0.085 -0.085 -0.085

Run 10269

Statistics for segment = 200

Channel B: ave. =18.227 +/- 0.002 sigma = 1.702

Cap ID 0: ave. =18.811 +/- 0.004 sigma = 1.355

Cap ID 1: ave. =17.917 +/- 0.004 sigma = 1.374

Cap ID 2: ave. =19.435 +/- 0.004 sigma = 1.362

Cap ID 3: ave. =16.745 +/- 0.004 sigma = 1.382

Statistics for segment = 400

Channel B: ave. =18.141 +/- 0.002 sigma = 1.645

Cap ID 0: ave. =18.640 +/- 0.004 sigma = 1.323

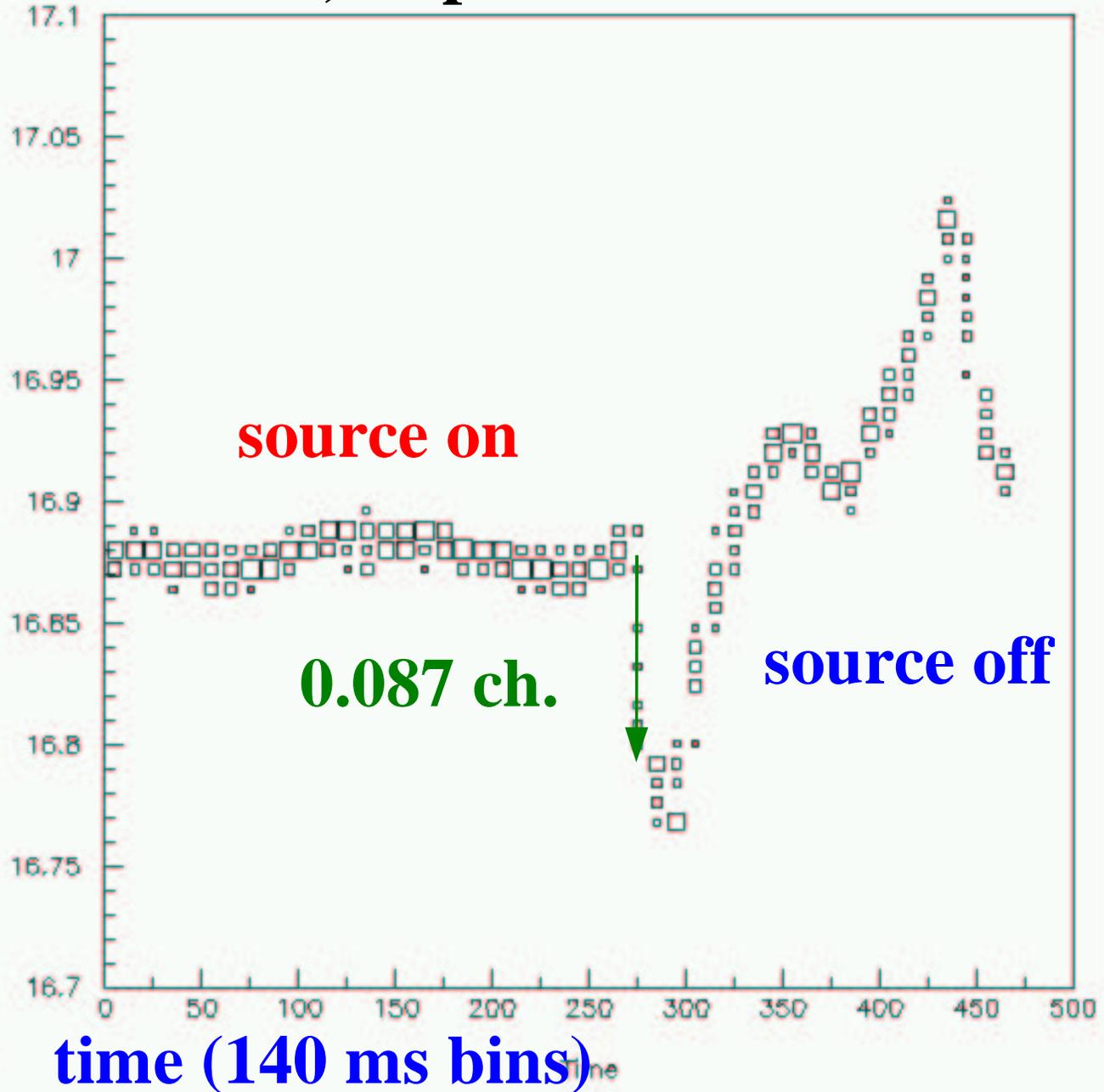
Cap ID 1: ave. =17.940 +/- 0.004 sigma = 1.343

Cap ID 2: ave. =19.281 +/- 0.004 sigma = 1.330

Cap ID 3: ave. =16.701 +/- 0.004 sigma = 1.353

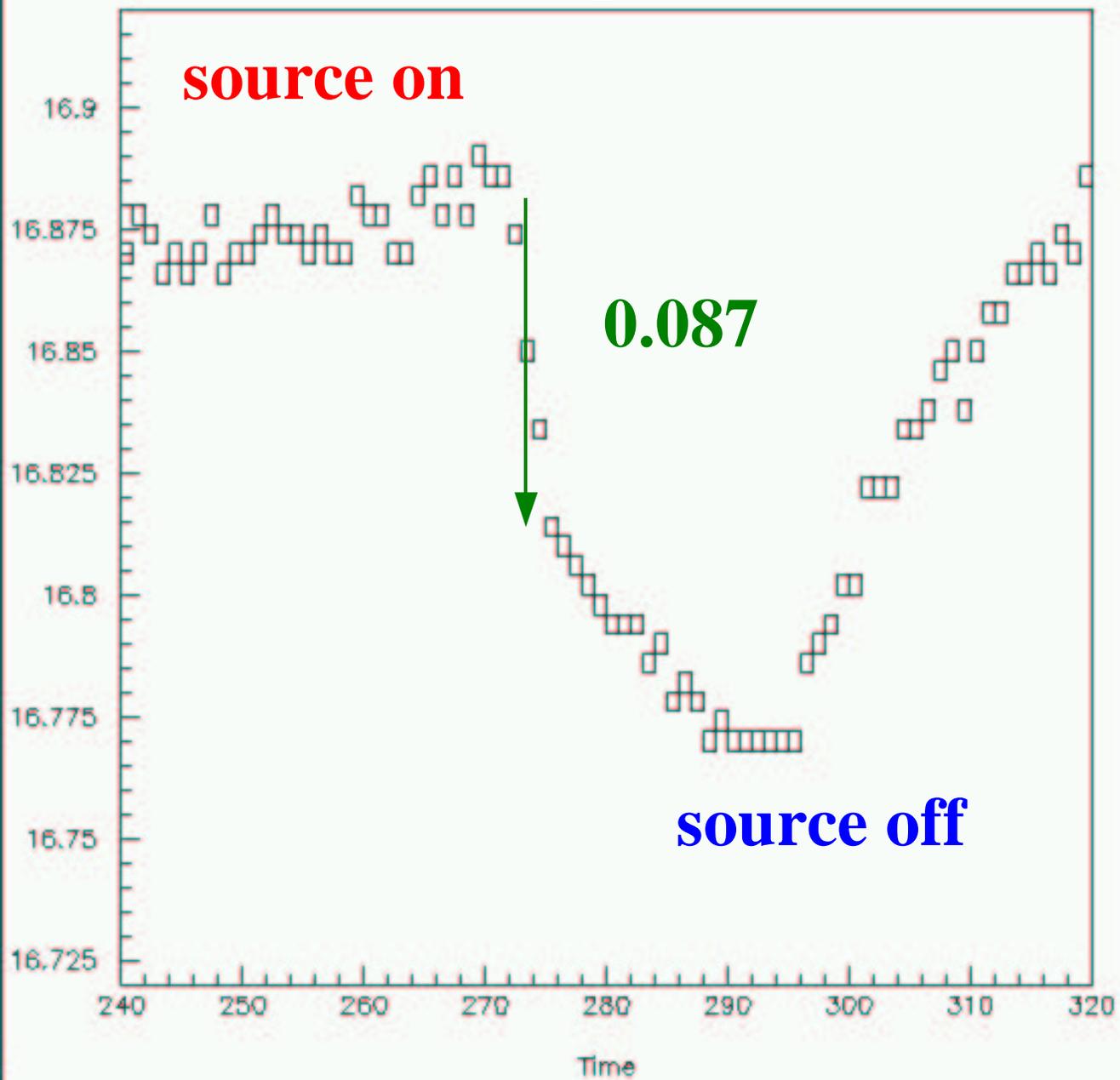
Run 10275, Cap ID = 3

**Mean
(channels)**



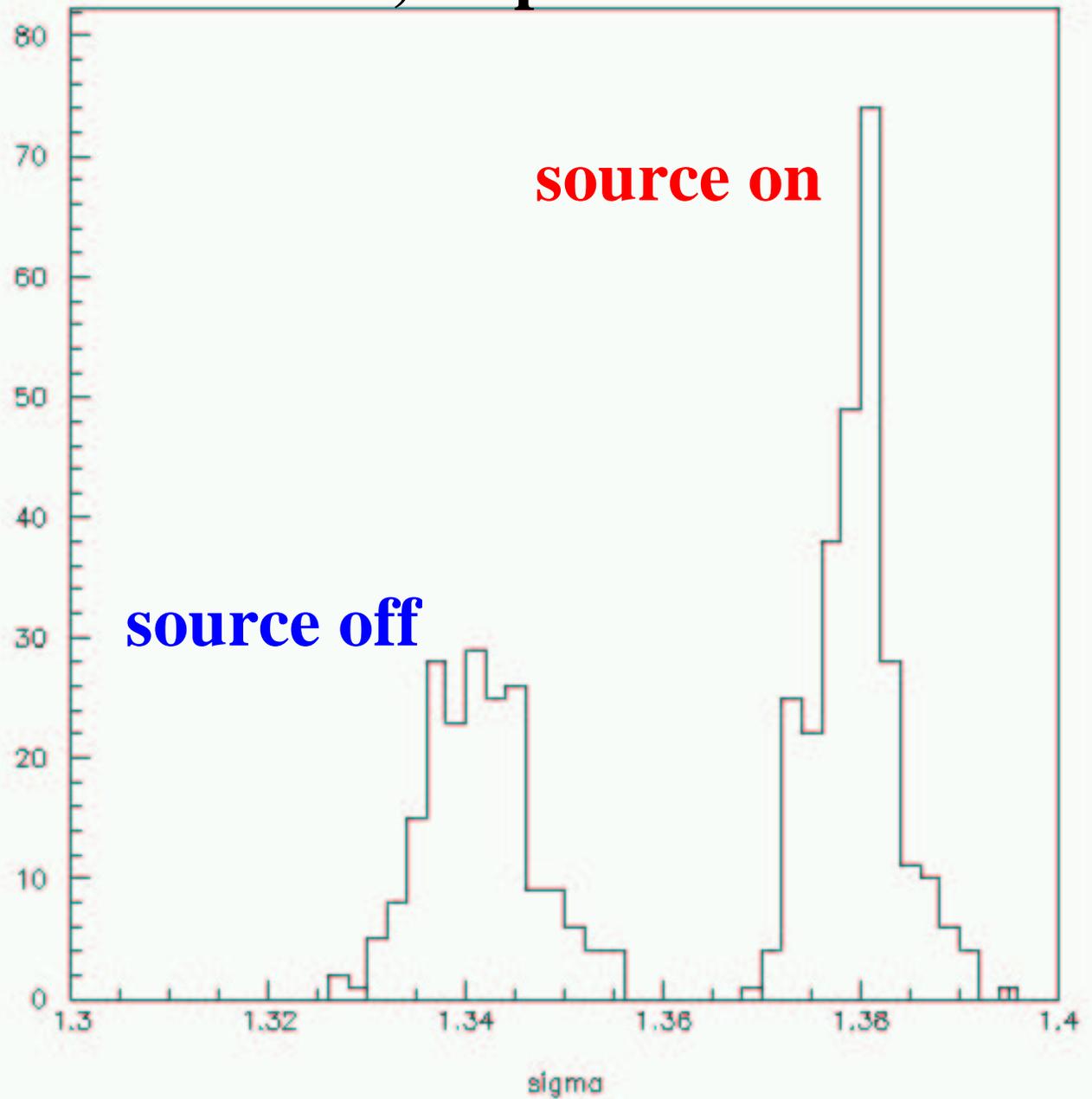
time (140 ms bins)

Run 10275, Cap ID = 3



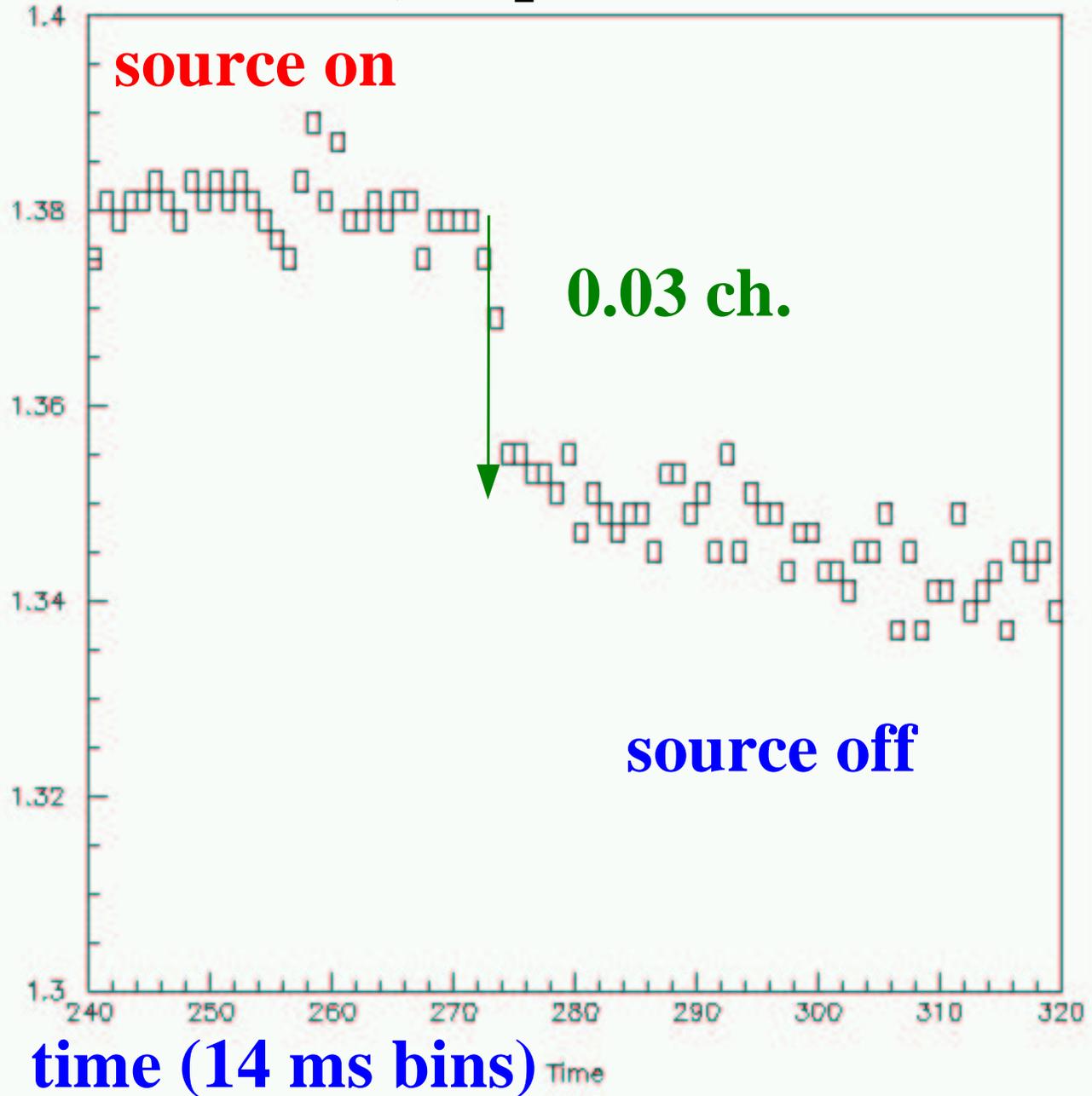
Run 10275, Cap ID = 3

**Dist. of
widths
(meas. per
0.002 ch.)**



Run 10275, Cap ID = 3

width



CERN CMS Week March 2001:

Source test as spin-off of demonstrator was born

SOURCE 10 cm/SEC
data point every 2 m
 $\Delta t = 20 \text{ nsec}$, use 10 nsec; 4×10^5 bkts

DATA POINT, $\approx 10^7$ readings

? how fast

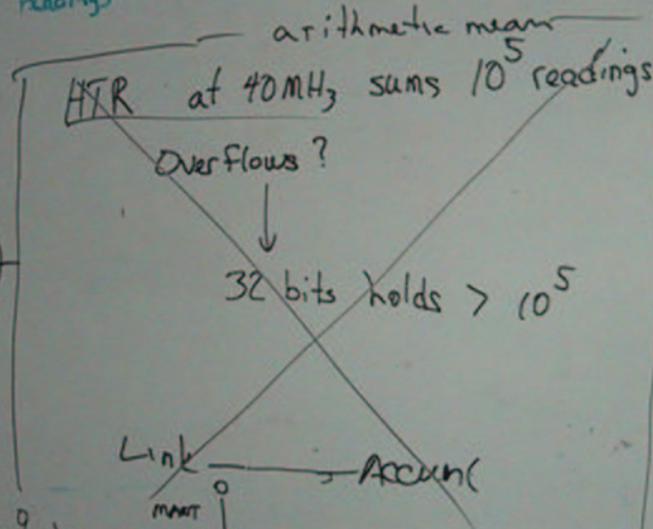
$$10^7 \times 25 \times 10^{-9} = \frac{1}{4} \text{ sec}$$

3

$$\Lambda_{Cu} = 3.7 \cdot 10^9 \frac{\text{decays}}{\text{sec}}$$

$$\sim 4 \cdot 10^9$$

$$\Lambda_{\mu Cu} = 4 \cdot 10^6 \text{ decays/sec}$$



HLSO MODE

128 M bytes/sec S-Link, Channel Link
(1 byte/reading)
gen 40 M readings/sec

→ Streaming mode

format, 1 chan → 1 byte
+ loss exponent

$$10 \times 32 = 320 = 8/\text{sec}$$



Conclusion:

**Scintillator + fibers, HPD, QIE,
TTCvx. TTCvi, Glink, HTR,
LVDS link, DCC, Slink, VME CPU
have been successfully integrated!**

**Calibration of HCAL by radioactive
source to 2% can be made to work**